

ENGINEERING EVALUATION REPORT

Plant Name:	SANTA CLARA DISTRICT ATTORNEY'S CRIME LAB
Application Number:	12682
Plant Number:	17058

Background:

The applicant is applying for an Authority to Construct for a new Emergency Stand-By Diesel Power.

The applicant has not yet determined which of three possible engines they will finally install, so they requested an authority to construct based on the risk findings of the most stringent of the following three possible engine configurations:

Source 1 will be one of the following three generator plus abatement system configurations:

S-1 Kohler Model 750REOZDB Generator, powered by a Detroit Diesel Model 12V200 engine, 1120 BHP

Abated by

A-1 CleanAir Systems Diesel Particulate Filter

or

S-1 Cummins Model 750DFHA Generator, powered by a Cummins Model QST30-G1 engine, 1135 BHP

Abated by

A-1 Miratech Model CBS16/2350 Diesel Particulate Filter

or

S-1 Caterpillar 750 EKW Genset, powered by a Caterpillar Model 3412C TA engine, 1210 BHP

Abated by

A-1 CleanAir Systems Diesel Particulate Filter

CUMULATIVE EMISSION CALCULATIONS

All three engines have been certified by the California Air Resources Board. For calculating emissions from these engines, CARB certified emission factors were used for all criteria pollutants except SO₂. They are as follows:

Manufacturer	Kohler/Detroit Diesel	Cummins	Caterpillar
Model	750REOZDB	750DFHA/QST30-G1	3412C
CARB Cert	U-R-007-092	U-R-002-0208	U-R-001-0278
EPA Family	4DDXL35.8GRP	4CEXL030.ABA	5CPXL27.0MRS
BHP	1120	1135	1210
Abated by ⁽¹⁾	Cleanaire Systems Diesel Particulate Filter	Miratech Diesel Particulate Filter	Cleanaire Systems Diesel Particulate Filter
PM (g/bhp-hr)	0.018	0.038	0.038
PM (lb/yr abated)	2.239	4.758	5.073
NO _x (g/bhp-hr)	5.374	5.447	5.742
CO (g/bhp-hr)	0.037	0.045	0.089
ORG (g/bhp-hr)	0.014	0.044	0.015
SO ₂ (g/bhp-hr)	0.183	0.183	0.183

⁽¹⁾ Abatement factors as provided by the abatement device manufacturers are as follows: CleanAir Systems: 85% PM, 90% CO and 95% ORG; Miratech: 90% PM, 90% CO and 70% ORG. A conservative abatement of 70% for PM was used in risk assessment calculations.

The California Air Resources Board Air Toxic Control Measure for Diesel Particulate Matter, 17 CFR 93115, Air Toxic Control Measure for Stationary Compression Ignition Engines (December 4, 2004) permits a maximum of 50 hours per year per engine for an engine with PM emissions less than or equal to 0.15 g/bhp-hr (see Attachment 1). All of the proposed engines meet this specification.

TOXIC RISK MODELING

The District uses PM emissions as a proxy for toxic emission exposure to surrounding residential and industrial populations. A PM emissions level of 0.58 lbs/year automatically triggers a health risk assessment according to Regulation 2, Rule 5. At a maximum 50 hours per year permitted operation, all of the engines exceed a PM emission level of 0.58 lbs/year. Therefore a risk assessment of the project is required.

Local "SJA" meteorological data was available for this site, and an ISCST3 model for PM₁₀ exposure was used to estimate maximum annual average ambient PM₁₀ concentrations. Distance and directionality were used as the primary considerations to determine sites of maximum exposure. Residential risk is based on a continuous 70-year exposure to annual average pollutant concentrations. Non-residential risk is calculated as approximately 66% of the equivalent residential risk. Risk at a school site is calculated as approximately 18% of the equivalent residential risk.

ISCST3 model runs were made for both rural and urban terrain inputs, each with and without raincaps. Because of cavitation effects in the immediate vicinity of the source, ISCST-Prime models were also run. The modeling inputs and results are summarized in Attachment 2.

At 50 hr/year operation, the generator with the highest risk is the Caterpillar engine, abated by the CleanAir Systems Diesel Catalyzed Particulate Filter. This configuration results in a maximum annual average residential GLC of 6.626 $\mu\text{g}/\text{m}^3$ per g/sec PM emissions, resulting in a carcinogenic risk of approximately 0.16 in a million. The maximum annual average non-residential GLC is 118.078 $\mu\text{g}/\text{m}^3$ per g/sec PM emissions, resulting in a carcinogenic risk of approximately 2.37 in a million. The maximum annual average GLC at the Juvenile Detention Hall is also 118.078 $\mu\text{g}/\text{m}^3$ per g/sec PM emissions, resulting in a carcinogenic risk of approximately 0.51 in a million. Associated health hazard indices are less than 1.0 for all cases.

The maximum calculated carcinogenic risk for any of the three engines is below 10 in a million and the maximum calculated chronic hazard index is less than 1.0, and so any of the the generators as proposed will be acceptable under Regulation 2, Rule 5.

CRITERIA EMISSIONS

Using the “worst case” emissions from the Caterpillar engine, criteria emissions from the project are as follows:

SOURCE S-1		PM10	NOX	CO	TOC	SO2
	BHP	G/BHP-HR	G/HR	G/HR	G/HR	G/HR
g/bhp-hr unabated	1210	0.038	5.742	0.089	0.015	0.183
TOTAL G/HR		46	6948	108	18	221
TOTAL LB/HR		0.10	15.32	0.24	0.04	0.49
LB/MGAL		1.84	278.49	4.34	0.72	8.88
TOTAL LB/DAY		2.43	367.61	5.73	0.95	11.72
TOTAL LB/50 HRS		5.068	765.85	11.94	1.99	24.41
TOTAL TPY		0.0025	0.383	0.006	0.001	0.012

All emission factors except SO2 from CARB certification U-R-001-0278

Emission factors for SO2 from AP 42, Chapter 3.4, Table 4.1

BACT/TBACT REVIEW

Under Regulation 2, Rule 2, any new source which results in an increase of criteria pollutants must be evaluated for adherence to BACT control technologies. A BACT review is required if the engine emits more than 10 lbs/day of any criteria pollutant. For all proposed engine configurations, NOx emissions exceed the trigger level of 10 lbs/day; therefore a BACT review is required.

For compression ignition internal combustion engines, BACT requires that the engine must be fired on “California Diesel Fuel” (fuel oil with less than 0.05% by weight sulfur content, and less than 20% by volume aromatic hydrocarbons). BACT also requires that the engine emit no more than 6.9 g/bhp-hr of NOx. All of the proposed engines meet BACT requirements.

The engine must also meet TBACT under Regulation 2, Rule 5. TBACT is triggered for all of the proposed engines as all proposed PM10 emissions exceed the trigger level of 0.58 lb/year. TBACT requires that the engine emit no more than 0.15 g/bhp-hr of PM. All of the proposed engines meet TBACT.

Compliance Determination:

Permitting of the proposed generator is covered under ministerial exemption, Chapter 2.3 of the BAAQMD Permit Handbook. CEQA is not triggered for emergency stand-by generators under this provision.

The generator is governed by the **California Air Resources Board's Air Toxic Control Measure for Stationary Compression Ignition Engines, CCR Title 17, Section 93115**. The explicit annual equipment usage limitation of 50 hours per year except for operation under emergency conditions (Reg 9-8-330) will be included as part of the permit conditions.

The engine is exempt from emission limitations of District **Regulation 9, Rule 8-301, 8-302, and 8-502**, "Nitrogen Oxides and Carbon Monoxide from Stationary Internal Combustion Engines," since it meets the provisions of **Regulation 9, Rule 8-110.2**, (operation of engines fired exclusively by liquid fuels, including, but not limited to diesel fuel, gasoline, and methanol).

The generator is also governed by the provisions of **Regulation 2, Rule 5, "New Source Review for Toxic Air Contaminants."**

Visible emissions will be required to meet Ringelmann 2.0 limitation per **Regulation 6-303**.

Sulfur emissions will be controlled by the requirement that any fuel used in the engine meet California Clean Air fuel content of 0.05% bw sulfur, per Regulation **9-1**.

This is a new source, and no sources are proposed to be closed in connection with this application. The facility will not emit more than 1 TPY of PM10 or SO2 or 15 TPY of POC or nitrogen oxides. Therefore, the facility is not subject to emission offset requirements under Regulation 2-2-302 or 2-2-303.

Conditions:

Condition #22513, setting out the operating conditions and recordkeeping requirements for operations at Source S-1 shall be made part of the source's authority to construct/permit to operate.

Recommendation:

I recommend that an Authority to Construct be issued for the following source:

S-1 Emergency Stand-By Diesel Generator; 750 KW

Abated by

A-1 Diesel Catalyzed Particulate Filter

subject to Condition #22513.

By _____ Date _____
Catherine Fortney

COND# 22513 -----

1. Emergency stand-by generator S-1 shall consist of one of the following three engine and abatement device configurations:
 - a. Kohler Model 750REOZDB Generator, powered by a Detroit Diesel Model 12V200 engine, abated by a CleanAIR PERMIT catalyzed diesel particulate filter;
 - b. Cummins Model 750DFHA Generator, powered by a Cummins Model QST30-G1 engine, abated by a Miratech Model CBS16/2350 HUG Soot Trap Diesel Particulate filter; or
 - c. Caterpillar 750EKW Genset, powered by a Caterpillar Model 3412C TA engine, abated by a CleanAIR PERMIT catalyzed diesel particulate filter.
2. Emergency stand-by generator S-1 shall be abated by abatement device A-1 at all times.
3. Emergency stand-by generator S-1 shall be fueled exclusively by diesel fuel having a sulfur content no greater than 0.05% by weight. [Reg 9-1-304]
4. Emergency stand-by generator S-1 shall only be operated to mitigate emergency conditions or for reliability-related operations. Operations for reliability-related activities shall be limited to 50 hours per generator in any consecutive 12-month period. Operation while mitigating emergency conditions is unlimited. [CARB ATCM for Stationary CI engines]
5. All maintenance, testing and other reliability-related operations shall be performed between the hours of 4:00 pm and 7:00 am.
6. Emergency conditions are defined as any of the following:
 - a. Loss of regular natural gas supply
 - b. Failure of regular power supply
 - c. Flood mitigation
 - d. Sewage overflow mitigation
 - e. Fire
 - f. Failure of a primary motor, but only for such time as needed to repair or replace the primary motor [Reg 9-8-231]
7. Reliability-related activities are defined as any of the following:
 - a. Operation of an emergency stand-by engine to test its ability to perform for an emergency use
 - b. Operation of an emergency stand-by engine during maintenance of a primary motor [Reg 9-8-232]

8. The emergency stand-by engine shall be equipped with a non-resettable totalizing meter that measures and records the hours of operation for the engine.
[Reg 9-8-530]
9. The following monthly records shall be maintained in a District-approved log for at least 2 years and shall be made available to the District upon request:
 - a. Total hours of operation for each generator
 - b. Total hours of operation under emergency conditions for each generator, and a description of the nature of the emergency condition
 - c. Total fuel usage for each generator [Reg 9-8-530]

ATTACHMENT 1

FINAL REGULATION ORDER

AIRBORNE TOXIC CONTROL MEASURE FOR STATIONARY COMPRESSION IGNITION ENGINES

(DECEMBER 4, 2004)

TABLE 1: SUMMARY OF THE EMISSION STANDARDS AND OPERATING REQUIREMENTS FOR NEW STATIONARY EMERGENCY STANDBY DIESEL-FUELED CI ENGINES > 50 BHP (SEE SUBSECTION (e)(2)(A)3.)				
DIESEL PM				OTHER POLLUTANTS
DIESEL PM STANDARDS (g/bhp-hr)	MAXIMUM ALLOWABLE ANNUAL HOURS OF OPERATION FOR ENGINES MEETING DIESEL PM STANDARDS			HC, NOx, NMHC+NOx, AND CO STANDARDS (g/bhp-hr)
	Emergency Use	Non-Emergency Use		
		Emission Testing to show compliance ²	Maintenance & Testing (hours/year)	
≤0.15 ¹	Not Limited by ATCM ³	Not Limited by ATCM ³	50	Off-Road CI Engine Certification Standards for an off-road engine of the same model year and horsepower rating, or Tier 1 standards for an off-road engine of the same maximum rated power. ⁴

1. Or off-road certification standard (title 13 CCR section 2423) for an off-road engine with the same maximum rated power, whichever is more stringent
2. Emission testing limited to testing to show compliance with subsections (e)(2)(A)3.
3. May be subject to emission or operational restrictions as defined in current applicable district rules, regulations, or policies.
4. The option to comply with the Tier 1 standards is available only if no off-road engine certification standards have been established for an off-road engine of the same model year and maximum rated power as the new stationary emergency standby diesel-fueled CI engine.

